Optimization and Evaluation of a Pressure Injury Risk Assessment Tool for use in the Critical Care Setting

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BACKGROUND
According to the Centers for Medicare and Medicaid, pressure injuries can be "reasonably prevented" with evidence-based care. Risk assessment is the cornerstone of evidence-based pressure injury prevention. Although twenty-six pressure injury risk assessment tools have historical use in the critical care setting, the Braden Scale remains the most commonly-employed tool. Conversely, use of the Braden Scale in the critical care setting has several limitations, including the omission of known critical care specific pressure injury predictors, sub-optimal validity and reliability, and a complex scoring matrix. These deficiencies present challenges to accurate risk prediction, effective primary prevention, and may leave vulnerable patients at risk.

PURPOSE
To optimize and evaluate the Norton Scale for use in the critical care setting and evaluate its reliability, validity, usability, and preference among critical care nurses.

METHODS
DESIGN: Single-site IRB-approved scholarly nursing practice project
SETTING: Large Magnet-designated, academic medical center, and level 1 trauma center in the southeast United States
TOOL SELECTION: The Norton Pressure Store Risk Assessment Scale (Norton Scale) was selected for optimization based on a systematic review of the literature; which revealed that it had the highest mean validity and reliability scores among the twenty-six tools with historical use in the critical care setting.

NORTON SCALE OPTIMIZATION:
CHANGED
- Statistically-significant critical care risk factors included
- Subjective measures made objective
- Vague language clarified

UNCHANGED
- Risk categories
- Total score range
- Subscale range
- Risk levels

VALIDITY
- Five possible versions subjected to peer review
- Experimental oNS selected by peer consensus

IMPLEMENTATION: A convenience sample of critical care nurses and certified WOC nurses assessed the pressure injury risk of a video simulated critical care patient using the optimized Norton Scale (oNS) and the Braden Scale. The facility’s incumbent tool, the Braden Scale, was used as the benchmark of the test patient’s level of risk. The WOC nurses’ assessments using the oNS represented the benchmark for the oNS total and subscale scores.

EVALUATION: Data were collected digitally via Qualtrics® (Qualtrics Analytics, Seattle, WA) and analyzed using SPSS statistical package version 24 (SPSS Inc, Chicago, IL).

RESULTS

Optimized Norton Scale (oNS)

<table>
<thead>
<tr>
<th>PHYSICAL CONDITION</th>
<th>Subscale</th>
<th>Score</th>
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<tbody>
<tr>
<td>Current or previous pressure injury</td>
<td>Edema</td>
<td>1</td>
</tr>
<tr>
<td>Malnutrition</td>
<td>BMI &lt;19 or &gt; 40</td>
<td>4</td>
</tr>
<tr>
<td>Systolic BP &lt; 90</td>
<td>Albumin level &lt; 3.4 g/dL</td>
<td>4</td>
</tr>
<tr>
<td>smoker</td>
<td>Oxygen saturation level &lt; 90%</td>
<td>2</td>
</tr>
<tr>
<td>Cardiac output or pulmonary disease</td>
<td>Mean arterial BP &lt; 60</td>
<td>2</td>
</tr>
<tr>
<td>ICU LOS &gt; 12 days</td>
<td>Hemodynamic instability</td>
<td>2</td>
</tr>
</tbody>
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MENTAL
- Independent ambulation
- Confusion
- Cognitive appropriateness
- Sarcopenia
- Alert and appropriate
- Impaired movement or sensory perception

PAIN
- Pain worsens with pressure
- Pain relief

INCONTINENCE
- Requires 2+ person assistance
- Average measure intraclass correlation coefficient = 0.887 (p < 0.001)
- Incontinence (r=0.885, p<0.001) and the total score (r=1), physical condition not reported because it was constant.

Dermatitis
- Hematologic instability
- Mean arterial BP > 60
- Diastolic BP > 40 or Systolic BP < 90
- Use of > 1 vasopressor
- Body temperature < 36°C or >38
- Continuously venous hemodialysis
- SpO2 < 90% < 0.60 for 5 min
- SpO2 < 90%
- Hemoglobin level < 7.7 g/dL
- P/F < 200

METHODOLOGY

oNS Validity & Reliability
- 100% of the participants accurately identified the patient as high risk for pressure injury
- Excellent Predictive Validity
- Excellent Reliability
- High Inter-rater Reliability

oNS Usability
- Usability Scale: 7.9 of 27
- Requires the lowest steps possible
- In easy to use
- Improves my effectiveness in protecting patients

oNS Preference
- Preference for the oNS versus the Braden Scale: 13.2%
- Agrees or Strongly Agrees (%): 75.1

CONCLUSION
Individualized, patient centered care that addresses the critically ill patient’s unique vulnerabilites is a necessary tool in the pressure injury prevention paradigm. This study demonstrates that the oNS, a critical care specific risk assessment tool, is a viable option for identifying and addressing those unique vulnerabilities. The oNS demonstrated excellent predictive validity, excellent reliability, and high interrater reliability. It also demonstrated superior usability and preference over the Braden Scale among critical care nurses because it is quick, easy to use, and critical care specific.

IMPLICATIONS FOR PRACTICE
The oNS is a practical risk assessment tool for prevention of pressure injuries among patients in the critical care setting. Implementation of the oNS into practice offers critical care nurses a quick, easy to use, and effective critical-care specific risk assessment tool. This increase in the efficiency of pressure injury risk assessment serves as the foundation for timely and effective initiation of risk-focused pressure injury prevention strategies and may help to mitigate associated adverse outcomes for the patient, nurse, and healthcare organization.

REFERENCES

ACKNOWLEDGEMENTS
To the nurses at University of Alabama in Birmingham Hospital, I thank you for your willingness to take time out of your busy day to participate in my project, from inception to fruition. Your contribution to this work will not be in vain. I promise to contribute to the nursing profession by disseminating the results of this project, where appropriate, to positively impact the care of patients at risk for pressure injuries.